Asia-Pacific Economic Cooperation

Develop Air Connectivity in the APEC Region

VIET NAM

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Glossary

The following section presents a list of commonly used expressions and abbreviations found in the report.

Connecting Potential – Common rates of passengers connecting beyond/behind when traveling through a hub to/from a particular region.

Induction/Stimulation – Initial spike in passenger demand when new nonstop service is offered due to better accessibility, shorter travel time, lower cost, etc.

List of Abbreviations

PDEW – Passenger daily each way (passenger demand in each direction between a select origin and destination).

SDEW – Seats daily each way (number of seats offered in each direction on a nonstop or one-stop flight segment).

OD – Origin and destination.

Airport Codes:

AAQ – Anapa, RUS

ACA – Acapulco, MEX

ADL – Adelaide, AUS

AER – Sochi, RUS

AGU – Aguascalientes, MEX

AKJ – Asahikawa, JPN

AKL – Auckland, NZ

ANF – Antofagasta, CHL

AOR – Alor Setar, MAS

AQP – Arequipa, CHL

ARH – Arkhangelsk, RUS

ASF – Astrakhan, RUS

ATL – Atlanta, US

AUS – Austin, US

AYP – Ayacucho, PE

BCD – Negros Occidental, PH

BDJ – Banjarmasin, INA

BHE – Blenheim, NZ

BJX – Silao, MEX

BKI – Kota Kinabalu, MAS

BKK – Bangkok, THA

BLI – Bellingham, US

BMV – Buon Ma Thuot, VN

BNA – Nashville, US

BNE – Brisbane, AUS

BOS – Boston, US

BPN – Balikpapan, INA

BUR – Burbank, US

BWN – Bandar Seri Begawan, BD

BXU – Butuan, PH

CAN – Guangzhou, PRC

CBO – Cotabato, PH

CCP – Concepción, CHL

CEB – Cebu, PH

CEI – Chiang Rai, THA

CEK – Chelyabinsk, RUS

CEN – Ciudad Obregón, MEX

CGK – Jakarta, INA

CGO – Zhengzhou, PRC

CGQ – Changchun, PRC

CGY – Cagayan de Oro and Iligan, PH

CHC – Christchurch, NZ

CJA – Cajamarca, PE

CJC – Calama, CHL

CJJ – Cheongwon-gu, ROK

CJU – Jeju, ROK

CKG – Chongqing, PRC

CLT – Charlotte, US

CME – Ciudad del Carmen, MEX

CNS – Cairns, AUS

CNX – Chiang Mai, THA

CSX – Changsha, PRC

CTS – Hokkaido, JPN

CTU – Chengdu, PRC

CUN – Cancun, MEX

CUZ – Cusco, PE

CVG – Cincinnati, US

CXR – Nha Trang, VN

DAD – Da Nang, VN

DAL – Dallas, US

DCA – Washington, US

DEN – Denver, US

DFW – Dallas, US

DGO – Durango, MEX

DGT – Dumaguete, PH

DJB – Jambi City, INA

DLC – Dalian, PRC

DLI – Da Lat, VN

DME – Domodedovo, RUS

DMK – Bangkok, THA

DPS – Bali, INA

DRW – Darwin, AUS

DTW – Detroit, US

DUD – Dunedin, NZ

DVO – Davao City, PH

EAT – Douglas County, US

EWR – Newark, US

EZE – Buenos Aires, ARG

FAT – Fresno, US

FLL – Fort Lauderdale, US

FOC – Fuzhou, PRC

FSZ – Shizuoka, JPN

FUK – Fukuoka, JPN

GDL – Guadalajara, MEX

GEG – Spokane, US

GMP – Seoul, ROK

GUM – Tamuning and Barrigada, GUM

GYS – Guangyuan, PRC

HAK – Haikou, PRC

HAN – Ha Noi, VN

HGH – Hangzhou, PRC

HKG – Hong Kong, China, HKC

HKT – Phuket, THA

HND – Tokyo, JPN

HNL – Honolulu, US

HRB – Harbin, PRC

HUI – Hue, VN

HUZ – Huizhou, PRC

IAD – Washington, US

IAH – Houston, US

ICN – Seoul, ROK

ILO – Ilo, PE

IQQ – Iquique, CHL

IQT – Iquitos, PE

ISG – Ishigaki, JPN

ITM – Osaka, JPN

IWK – Iwakuni, JPN

JFK – New York, US

JHB – Johor, MAS

JJN – Quanzhou, PRC

JNZ – Jinzhou, PRC

JOG – Yogyakarta, INA

JUL – Juliaca, PE

KBR – Kota Bharu, MAS

KBV – Krabi, THA

KCH – Kuching, MAS

KGD – Kaliningrad, RUS

KHH – Kaohsiung, CT

KHN – Nanchang, PRC

KIX – Osaka, JPN

KKE – Kerikeri, NZ

KLO – Kalibo, PH

KMG – Kunming, PRC

KNH – Kinmen, PRC

KNO – Kuala Namu, INA

KOJ – Kirishima, JPN

KRR – Krasnodar, RUS

KUF – Samara, RUS

KUL – Kuala Lumpur, MAS

KWL – Guilin, PRC

KZN – Tatarstan, RUS

LAS – Las Vegas, US

LAX – Los Angeles, US

LED – Saint Petersburg, RUS

SVX – Yekaterinburg, RUS

LGA – NY–La Guardia, US

LGK – Padang Matsirat, Langkawi, MAS

LHW – Lanzhou, PRC

LIM – Lima, PE

LOP – Lombok, INA

LPF – Liupanshui, PRC

LPT – Lampang, THA

MBT – Masbate City, PH

MCC – Sacramento, US

MCO – Orlando, US

MDW – Chicago, US

MDZ – Mendoza, ARG

MEL – Melbourne, AUS

MEX – Mexico City, MEX

MFM – Macau, MAC

MIA – Miami, US

MLM – Alvaro Obregon, Michoacan, MEX

MNL – Manilla, PH

MRY – Monterey, US

MSP – Minneapolis–Saint Paul, US

MTT – Cosoleacaque, MEX

MTY – Apodaca, MEX

MZG – Magong City, CT

NBC – Nizhnekamsk, RUS

NGB – Ningbo, PRC

NGO – Nagoya, JPN

NKG – Nanjing, PRC

NKM – Nagoya, JPN

NNG – Nanning, PRC

NPE – Napier, NZ

NPL – New Plymouth, NZ

NRT – Tokyo, JPN

NSN – Nelson, NZ

NTG – Nantong, PRC

OAK – Oakland, US

OAX – Oaxaca, MEX

OKA – Naha, JPN

OOL – Gold Coast, AUS

ORD – Chicago, US

OVB – Novosibirsk, RUS

OZC – Ozamiz, PH

PDG – Sumatra, INA

PEK – Beijing, PRC

PEN – Penang, MAS

PER – Perth, AUS

PHL – Philadelphia, US

PHX – Phoenix, US

PIU – Piura, PE

PLM – Palembang, INA

PLW – Palu, INA

PMC – Puerto Montt, CHL

PMR – Palmerston North City, NZ

PNK – Pontianak, INA

POM – Port Moresby, PNG

PPQ – Paraparaumu, NZ

PQC – Phu Quoc, VN

PSP – Palm Springs, US

PUS – Busan, ROK

PVG – Shanghai, PRC

PVR – Puerto Vallarta, MEX

PXU – Pleiku, VN

PYX – Pattaya, THA

RDU – Raleigh, Durham, US

REP – Siem Reap, KHM

REX – Reynosa, US

RGN – Mingaladon, MMR

RNO – Reno, US

ROC – Rochester, US

ROT – Rotokawa, NZ

ROV – Rostov-on-Don, RUS

RSU – Yeosu, ROK

RTW – Saratov City, RUS

RXS – Roxas City, PH

SAN – San Diego, US

SCL– Santiago, CHL

SEA – Seattle, US

SFO – San Francisco, US

SGN – Ho Chi Minh, VN

SHA – Shanghai, PRC SHE – Shenyang, PRC

SIN – Singapore, SGP

SIP – Simferopol, UKR

SJC – San Jose, US

SJD – San Jose del Cabo, MEX

SLC – Salt Lake City, US

SLP – San Luis Potosi, MEX

SMF – Sacramento, US

SNA – Santa Ana, US

SOC – Solo/Surakarta, INA

SPN – Saipan, US

SRG – Semarang, INA

STL – St. Louis, US

STW – Stavropol Krai, RUS

SUB – Surabaya, INA

SVO – Moscow, RUS

SVX – Koltsovo, RUS

SWA – Jieyang Chaoshan, PRC

SYD – Sydney, AUS

SYO – Sakata, JPN

SYX – Sanya, PRC

SZX – Shenzhen, PRC

TAC – Tacloban, PH

TAM – Tampico, MEX

TAO – Qingdao, PRC

TAV – Tau, ASM

TBP – Tumbes, PE

TDX – Trat, THA

TGG – Kuala Terengganu, MSA

TGZ – Chiapa de Corzo, MEX

TIJ – Tijuana, MEX

TKG – Bandar Lampung, INA

TLC – Toluca, MEX

TNA – Jinan, PRC

TPE – Taipei, CT

TPP – Tarapoto, PE

TRC – Torreon, MEX

TRU – Trujillo, PE

TSA – Songshan, CT

TSN – Tianjin, PRC

TTJ – Tottori, JPN

TXG – Taichung, CT

TYN – Taiyuan, PRC

UFA – Ufa, RUS

UIH – Qui Nhon, VN

UKB – Kobe, JPN

UPG – Makassar, INA

URC – Urumqi, PRC

USM – Koh Samui, THA

VCL – Chu Lai, VN

VDH – Dong Hoi, VN

VER – Veracruz, MEX

VII – Vinh, VN

VKO – Moscow, RUS

VOZ – Voronezh, RUS

VSA – Villahermosa, MEX

VVO – Vladivostok, RUS

WAG – Whanganui, NZ

WEH – Weihai, PRC

WLG – Wellington, NZ

WNZ – Wenzhou, PRC

WRE – Whangarei city, NZ

WUH – Wuhan, PRC

WUX – Wuxi, PRC

XIY – Xi'an, PRC

XMN – Xiamen, PRC

YEG – Edmonton, CDA

YGJ – Yonago, PRC

YHZ – Halifax, CDA

YKA – Kamloops, CDA

YLW – Kelowna, CDA

YNJ – Yanji, PRC

YOW – Ottawa, CDA

YPR – Prince Rupert, CDA

YQM – Moncton, CDA

YQR – Regina, CDA

YSJ – Saint John, CDA

YTS – Timmins, CDA

YUL – Montreal, CDA

YVR – Vancouver, CDA

YWG – Winnipeg, CDA

YXC – Cranbrook, CDA

YXS – Prince George, CDA

YXT – Terrace-Kitimat, CDA

YYB – North Bay, CDA

YYC – Calgary, CDA

YYJ – Victoria, CDA

YYZ – Toronto, CDA

YZP – Sandspit, CDA

YZR – Sarnia, CDA

ZAL – Valdivia, CHL

ZCL – Calera de Victor Rosales, MEX

ZQN – Queenstown, NZ

ZUH – Zhuhai, PRC

1. Introduction to the project

The APEC Secretariat and Economies have observed that the flow of goods, services, capital and people in the APEC Region is constrained by air connectivity limitations and gaps that exist between the APEC economies, particularly between the Americas and Asia Pacific. Improving connectivity is a long-term target of the APEC economies. The APEC Tourism Working Group (TWG) and Transport Working Group (TPTWG) are particularly interested in pursuing this long-term target.

This Project (the "Project") was proposed in 2014 by Thailand and co-sponsored by Australia; Indonesia; Malaysia; Peru; and the Philippines; Chinese Taipei and aims to develop air connectivity in the APEC Region and in turn stimulate a more efficient flow of goods, services, capital and people. The Project has the following objectives:

- To develop market demand-based recommendations for potential new routes, improved flight schedule connection times, and hubs between APEC economies based on analysis of air passenger flow, schedules and new aircraft range capability, including analysis of the number of seats, flights and air traffic.

- To help airlines and regulators develop more accurate demand predictions so they can in turn help APEC economies by providing better air connectivity services, capacity and schedules.

The Project was approved in December 2014, with IATA Consulting selected as the consultant in May 2015. IATA was mandated to complete the following tasks:

1. Develop market demand-based recommendations for potential new routes.

2. Provide recommendations to improve connections between flights at the main hubs linking the APEC economies.

3. Determine which APEC market-pairs could benefit from the introduction of new aircraft with extended range.

2. Approach followed and data used

This section explains the methodology applied by IATA and presents the data used to feed the various underlying analysis. To conduct the analysis, IATA took systematic steps identified in Figure 1.

A. Gap Analysis	B. Induction	C. Connecting Market	D. Market Growth	F. Route Forecast
OD demand / Seat Offer → Gaps (opportunities for new and/or extended services)	Induction benchmark of OD market	Assessment of behind and beyond connecting market	Apply market growth (IATA forecast)	Potential new/extended routes

Route opening threshold

E. Route threshold
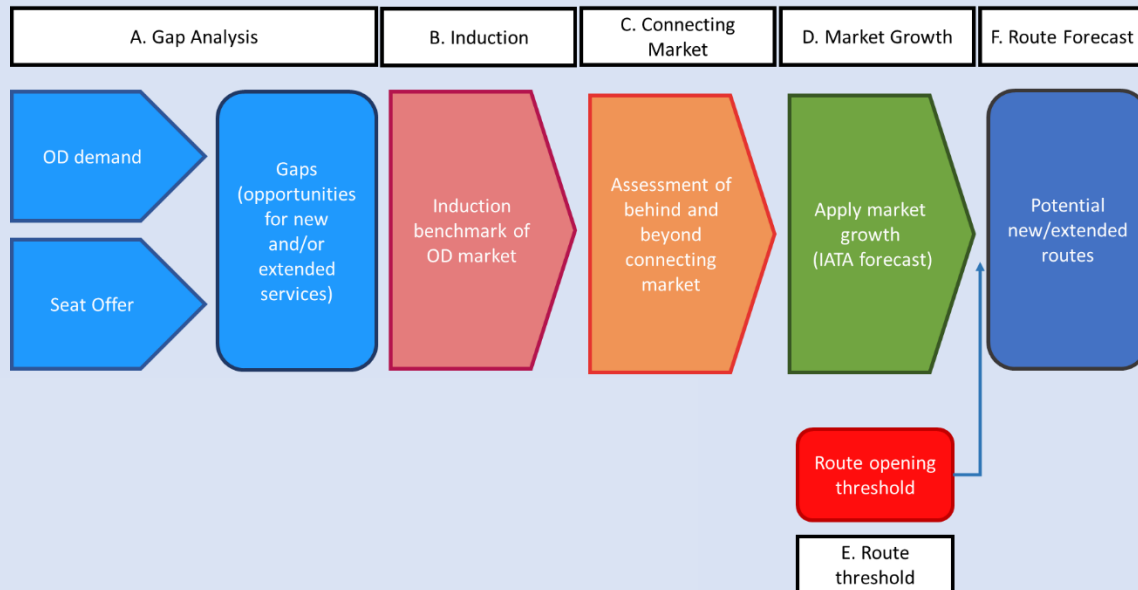
Figure 1: Process used to complete analytical work

The first step involved a demand-supply gap analysis aimed at identifying the unserved routes, presenting potential demand for future development. The size that this potential demand could actually represent if turned into direct service in the future was subsequently forecast, using realistic assumptions related to induction, connecting potential and demand growth.

2.1 Data fueling the model

Principal data for the model originates from Airport IS. IATA's Airport IS system uses IATA billing and settlement plan data to provide detailed demand and supply information on total air traffic. This data has been available for over a 10-year historical period (since 2005).

> *Approximately 18,500 international APEC routes were analyzed in the execution of this study. Airport IS data was particularly relevant in the gap analysis and assumption development.*

Academic articles and published ratios were also used to justify some of the assumptions, including induction and origin destination traffic captured through direct service.

For some of the other variables used in the final traffic determination, economic forecasts were extracted from IHS Global Insight, one of the world's largest commercially available economic databases.

Tourism data was extracted from the World Travel and Tourism Council.

2.2 Gap analysis

IATA applied a funnel approach in conducting the analysis. It first considered the market at the economy pair level, followed by city pairs leading to a market potential assessment (see figure below). Both seat supply and seat demand were considered in the analysis to identify gaps in air service.

Economy pairs
gap analysis

Unserved
airport pairs
identification

Market
potential
assessment

Route selection
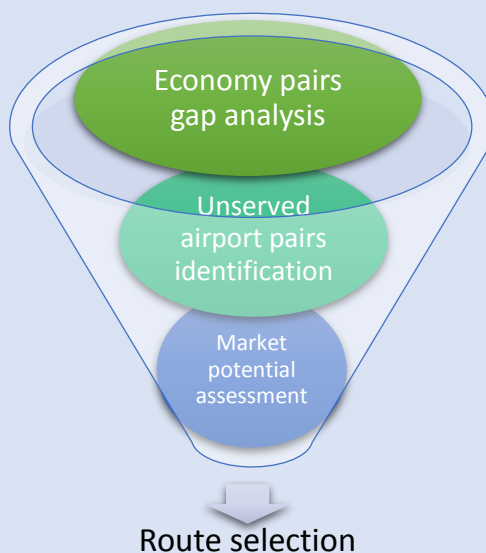
Figure 2: Funnel approach used to conduct analysis

The economy-pair analysis allowed IATA to identify unserved markets.

As an illustration, the analysis showed that there is a daily demand of 1,643 Passengers Daily Each Way (PDEW) via existing connecting routes between the US and Viet Nam, while no non-stop services are presently available.

When extending the analysis down to the city pairs, it was possible to identify the largest unserved routes between the two economies: there are 221 PDEW traveling between SGN and LAX.

The top 30 unserved routes from Viet Nam to the entire APEC region are presented in the table below.

Origin Airport	Origin Economy	Destination Airport	Destination Economy	2015 OD Demand (PDEW)	Non-Stop Seats in 2015 (SDEW)	1-stop seats in 2015 (SDEW)
SGN	Viet Nam	LAX	United States	221	0	0
SGN	Viet Nam	SFO	United States	162	0	0
SGN	Viet Nam	JFK	United States	106	0	0
SGN	Viet Nam	IAD	United States	79	0	0
SGN	Viet Nam	YYZ	Canada	70	0	0
SGN	Viet Nam	IAH	United States	69	0	0
SGN	Viet Nam	ORD	United States	67	0	0
SGN	Viet Nam	PEN	Malaysia	67	0	0
HAN	Viet Nam	LAX	United States	66	0	0
HAN	Viet Nam	SYD	Australia	62	0	0
SGN	Viet Nam	BNE	Australia	58	0	0
DAD	Viet Nam	BKK	Thailand	56	0	0
HAN	Viet Nam	CGK	Indonesia	52	0	0
SGN	Viet Nam	BOS	United States	51	0	0
HAN	Viet Nam	MEL	Australia	51	0	0
HAN	Viet Nam	JFK	United States	48	0	0
SGN	Viet Nam	PER	Australia	46	0	0
SGN	Viet Nam	HKT	Thailand	44	0	0
SGN	Viet Nam	ATL	United States	40	0	0
SGN	Viet Nam	HNL	United States	39	0	0
SGN	Viet Nam	YVR	Canada	38	0	0
SGN	Viet Nam	DPS	Indonesia	35	0	0
HAN	Viet Nam	SFO	United States	34	0	0
HAN	Viet Nam	CTS	Japan	34	0	0
SGN	Viet Nam	CTU	China	33	0	0
HAN	Viet Nam	IAD	United States	29	0	0
HAN	Viet Nam	HNL	United States	29	0	0
HAN	Viet Nam	PEN	Malaysia	28	0	0
SGN	Viet Nam	SEA	United States	28	0	0
SGN	Viet Nam	ADL	Australia	27	0	0

Table 1: Top 30 unserved routes from Viet Nam to APEC, 2015 data

2.3 Induction

To determine realistic estimates of the success of new air service, various assumptions were considered and applied to current passenger demand.

Induction is a well proven concept that explains how new direct air service has a significant impact on increasing the total number of O&D passengers on a city pair market. This is due to product improvement: shorter travel time, greater convenience and more affordable ticket prices. The extent to which the market will be stimulated varies based on current levels of service (price and flight frequency) offered on a particular route. As stated in the Successful Air Service Development presentation (ICF International, 2014) a market's first non-stop flight can stimulate demand by 100% to 300%.

IATA quantified this induction value to show a relationship between two primary factors: region pair and the size of the market before a new route is initiated.

The table below shows the stimulation rates considered for this analysis of Viet Nam. For some instances where inadequate data (less than 4 routes) to conduct a region pair analysis was available, other variables were considered including the average of all routes, the average of long-haul routes or the average of short-haul routes, depending on the specific market.

Market	Base of 10,000 Annual Pax	Base of 25,000 Annual Pax	Base of 50,000 Annual Pax
All APEC Economies	130%	42%	18%
Long Haul	101%	36%	16%
Short Haul	150%	50%	21%
Australasia - South East Asia	159%	75%	44%
North America-Asia	104%	40%	
Asia - South East Asia	162%	53%	
Asia - North East Asia	155%	58%	27%
South East Asia - China	203%	78%	
South East Asia - North East Asia	125%		
Within Asia	160%	55%	24%
Within Southeast Asia	205%		

Table 2: Induction rates used during the analysis

2.4 Connecting potential

Increasing the quality of connections through alliance agreements, codeshares, shorter journey times or fewer stops increases overall travel demand in connecting markets. It is a normal phenomenon for new routes to not only increase demand for the city pairs served but also for beyond and behind destinations that are now more easily accessible (Swan, 2008). On long-haul routes, typically two-thirds of the passengers will make a connection.

IATA's analysis found that connecting markets would stimulate at various rates depending on the region of origin and the hub airport being flown through. These ratios are applied in determining the impact of a new route on connecting flows.

For Viet Nam, it is both the hubs at the destinations flown to and the hubs within Viet Nam which will have an impact on this value. The tables below present the connecting ratios at SGN, HAN and a selection of hubs flown to/ from Viet Nam in the various APEC regions.

	SGN	HAN
North America	16.2%	
Australasia	39.9%	
Asia	9.7%	5.3%
South East Asia	9.4%	3.7%
China	4.9%	7.2%
North Asia	14.4%	13.7%

Table 3: Connecting potential rates used when flying to/from APEC regions and SGN/HAN

	LAX	SFO	ORD	BNE	MEL	YYZ
South East Asia	31.3%	19.9%	94.7%	12.7%	9.3%	49.6%

Table 4: Connecting potential rates used when flying to/from South East Asia to a selection of other main hubs

2.5 Demand growth

This refers to the consideration of the natural growth observed on a market segment. IATA Economics publishes a detailed inter and intra-regional global traffic forecast. These demand growth forecasts were used to provide a regionally specific rate of growth to and from Viet Nam between 2016 and

2018. Growth was typically seen to be around 5%. Demand growth also refers to the fact that approximately 80% of a market will choose a non-stop flight option if it is available (Belobaba, 2015).

2.6 Other

Other factors including distance and available traffic rights were used to refine the assessment of potential new services to be opened. Distance considers the possibility of offering a non-stop flight with existing technology, using 15,000km as a maximum distance. Available traffic rights consider the bilateral agreements between economies and the current use of those bilateral rights.

2.7 Final route forecast

After conducting the gap analysis and applying the established rates from the various assumptions, the future market potential was estimated, as illustrated in Figure 3 below for the LAX-SGN route.

| | | | | 1 | 2 | 4 | |
Origin Airport	Destination Airport	Destination Economy	2015 OD Non-direct Demand	OD Captured Though Deorect Service	OD Stimulation	Behind/Beyond Connecting Potential	Caculations
SGN	LAX	United States	(A) 221	(B) 80%	(C) 12	(D) 31%	
				(1) 177	21		(1) = AxB
				(2)			(2) = 1xC
			Subtotal	(3)	198		(3) = 1+2
			SGN - LAX Total Market Potential (2015 Base)			(4) 288	(4) = 3/(1-D)

Figure 3: Example of the various assumptions being applied to determine the potential for a new air service

3. Viet Nam

A summary of Viet Nam's economy and demographics, aviation demand, and airport specific information is presented in this section.

3.1 Economy and demographics

Viet Nam is the easternmost economy on the Indochina Peninsula in Southeast Asia. It is bordered by China to the north, Laos to the northwest, Cambodia to the southwest, and Malaysia across the South China Sea to the southeast.

3.1.1 Demographics

Viet Nam's population is estimated at 94.4 million in 2016, being the world 14th most populous nation (United Nations, 2015). Its population density is approximately 304 persons per square kilometre in 2016 (United Nations, 2015).

The dominant ethnic group in Viet Nam is the Kinh, which constitutes nearly 73.6 million people, or 85.8% of the population (2009 census). However, Viet Nam is also home to 54 ethnic minority groups, including the Hmong, Dao, Tay, Thai, and Nùng. The official national language of Viet Nam is Vietnamese, which is spoken by the majority of the population.

Viet Nam's population is forecasted to grow at 0.85% p.a. for the next 10 years, lower than its historical 1.06% annual growth rate (2006-2016) (United Nations, 2015).

In 2015, about 33.6% of the total population live in the urban areas. In the past five years, the rate or urbanization registered an average rate of 2.95% p.a. (Central Intelligence Agency, 2015). Major urban cities and populations include:

City	Population (millions)
1. Ho Chi Minh City	3.47
2. Ha Noi (Capital)	1.43
3. Da Nang	0.75
4. Haiphong	0.60
5. Bien Hoa	0.41
6. Hue	0.29

Table 5: Largest cities in Viet Nam (World Population Review, 2016)

3.1.2   Economy

Viet Nam is still transitioning to a market-based economy. However, strong economic expansion has allowed the economy to achieve significant poverty reduction and inclusive growth over the last 25 years. The economy of Viet Nam has transformed from an agrarian to a service economy. At 2015, services make up of 43.7% of Viet Nam's GDP, followed by industry (38.8%) and agriculture (17.4%). In 2015, Viet Nam ranked 50th in terms of economy size and 129th in terms of per capita income. Its GDP growth has been approximately 6.03% p.a. over the past three years (International Monetary Fund, 2016).

Viet Nam has boosted its international economic integration as it enters into more free trade agreements with the Eurasian Economic Union, the European Union, Republic of Korea and the Trans-Pacific Partnership. At 2014, Viet Nam's top export partners are China; Japan; and the United States. Main export commodities include clothes, shoes, electronics, seafood, crude oil, rice, coffee, wooden products, machinery. Its top import origins are China; Japan; and Republic of Korea. Main imports

include machinery and equipment, petroleum products, steel products, and raw materials for the clothing and shoe industries (Central Intelligence Agency, 2014).

With agriculture still accounting for almost half the labour force, and with significantly lower labour productivity than in the industry and services sectors, future gains from structural transformation could be substantial. In addition, the economy also wields too much influence in allocating land and capital, giving rise to heavy economy wide inefficiencies. So, adjusting the role of the economy to support a competitive private sector–led market economy remains a major opportunity (World Bank, 2016).

3.1.3   Tourism

Viet Nam has been emerging as one of the world's most popular destinations. Historical past and modern present, different religions and oriental traditions are blended to give Viet Nam a colourful image.

Tourism is playing an increasingly significant role in Viet Nam's development, contributing (directly and indirectly) VND367.2 trillion (USD16.4 billion) to the economy in 2014, equivalent to 9.3% of the GDP. To drive long-term sector growth, the government has announced plans to channel funds into projects across the northern region, with a view to attracting 55m domestic and foreign tourists per year by 2030. In 2015, Viet Nam's international tourist arrivals is estimated to be 5.9 million, and is forecasted to increase to 10.7 million by 2015, at a rate of 6.1 p.a. (World Travel and Tourism Council, 2015).

3.2 Aviation demand

3.2.1   Recent demand growth

Passenger air traffic to and from Viet Nam has grown at an average of 16.2% p.a. between 2004 and 2014. This demand growth is seen in the figure below. According to the IATA, Viet Nam is among the seven fastest growing regions in terms of passenger traffic between 2015 and 2017.
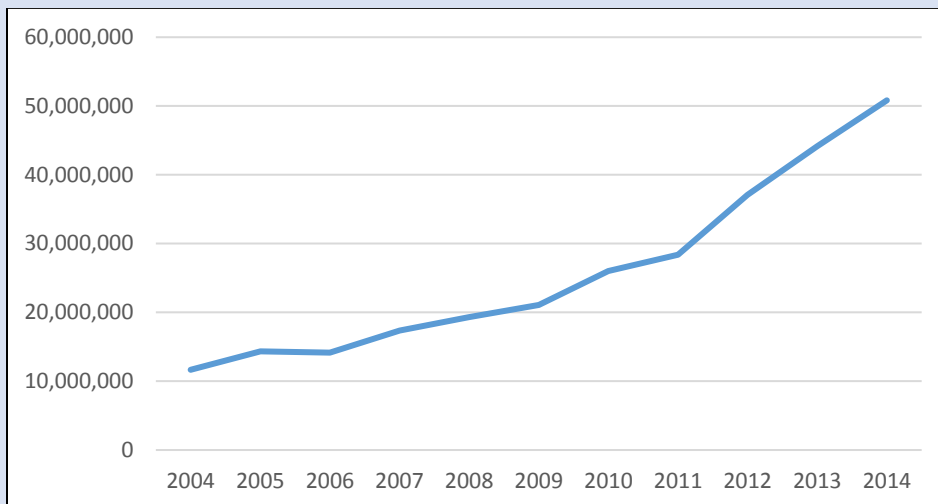
Figure 4: Total air traffic Viet Nam 2004-2014 (Source: Albatross Airport, 2016)

While air freight accounts for a very small amount of Viet Nam's trade by volume, it represents 25% of Viet Nam's trade by value, or USD29 billion (IATA, 2014). In the past decade, the air freight tonnage growth rate remains at a high speed of 13.3% p.a. on average.

3.2.2 Current air services to Viet Nam

The routes connecting Viet Nam to various destinations within APEC region are shown in the below figure.
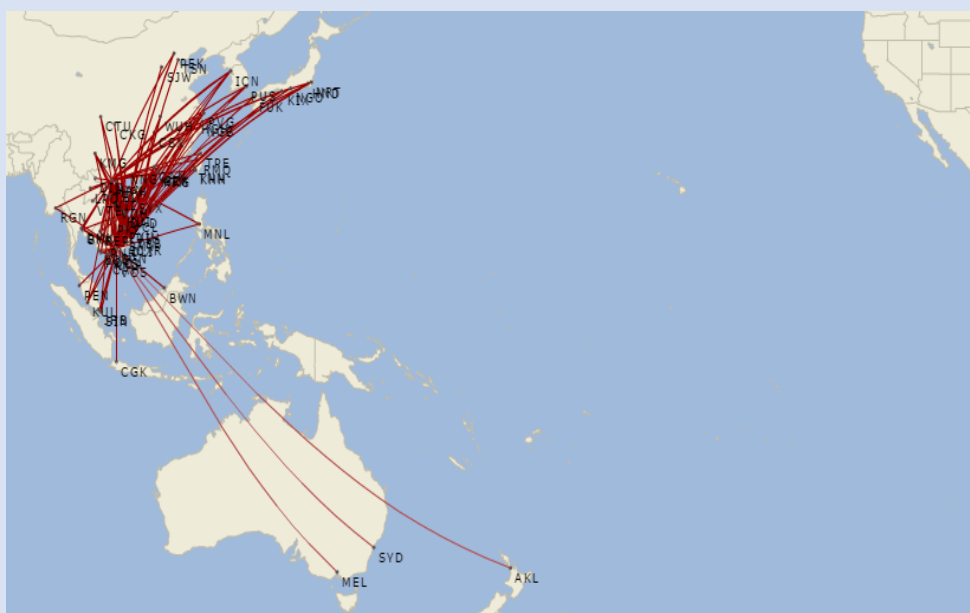
Figure 5: Non-stop service to and from Viet Nam and top APEC destinations June 2016 (Source: Airport IS)

International capacity to Viet Nam has grown from 9.9 million inbound seats in 2005 to 39.4 million in 2015. Growth over this time period has mainly been driven from Asia (Russia; Singapore; Thailand, etc.), Europe (France, Germany, UK, etc.), and Middle East (Qatar, United Arab Emirates) (Airport IS, 2016).

In 2015, the strongest direct aviation capacity growth within the APEC region was to Brunei Darussalam (up by 414.8% from 5,444 to 28,028), China (up by 42.1%), Korea (up by 26.2%), and Thailand (up by 23.0%) (Airport IS, 2016).

3.2.3   Aviation and the economy

Economic Footprint and Consumer Benefits

Aviation contributes USD6 billion to Viet Nam's GDP and supports over 230,000 jobs (IATA, 2014). The aviation industry has benefits for visiting friends and family and the shipping of high value products. Between 2008 and 2013, Viet Nam's passenger traffic nearly doubled, and up to 80% of international tourists come to Viet Nam by air. In 2014, Viet Nam generated VND165,080 billion in visitor exports (World Travel and Tourism Council, 2015). Air freight represents 25% of Viet Nam's trade by value, or USD29 billion.

Long-term impact

Economically, aviation has a long-term impact in Viet Nam. According to Oxford Economics (2011), Air travel enables long-term economic growth by:

- Opening up foreign markets to Viet Nam's exports
- Lowering transport costs
- Increasing the flexibility of labor supply
- Speeding the adoption of business practices such as just-in-time-inventory management
- Raising productivity and hence the economy's long-run supply capacity

3.2.4   Government position on aviation

The government of Viet Nam has been taking active initiatives to bolster the overall competitiveness of its aviation sector by improving air connectivity and promoting private investment.

In terms of international air service agreement, the government of Viet Nam signed the ASEAN multilateral agreement on the full liberalization of passenger air service with the other nine ASEAN members in 2010. The agreement seeks to liberalize market access and ownership and control requirements for air carriers in the region, and is a precursor to an eventual Single Aviation Market arrangement targeted for 2015. In addition, Viet Nam has already put the landmark ASEAN-China Air Transport Agreement in force. This agreement and its first protocol provide for unlimited third/fourth

freedom access for airlines on both sides, effectively superseding the relevant bilateral agreements between Viet Nam and China. In 2010, Viet Nam authorities signed Horizontal Aviation Agreement with EU to remove nationality restrictions in the bilateral air services agreements and thereby allows European airlines to operate flights between any EU Member Economy and Viet Nam.

The Vietnamese government is creating a framework to stimulate private investments in the aviation industry, as the booming growth in the aviation market is posing a great demand for better airport infrastructure, greater financing and knowhow from the private sector. New aviation law, which took effect in July 2015, had aimed to promote the roles of private investors. Aviation authorities have also indicated plans to open airports to foreign investment and management, and to privatize the airports corporation of Viet Nam.

3.3 Airport specific information

3.3.1   Busiest airports in Viet Nam

Viet Nam now has around 20 airports for regular civil flights. Expansion programs are underway at Ha Noi and Ho Chi Minh City airports, with the new Long Thanh International Airport expected to be ready by 2020.

Rank	Airport	Most recent annual traffic statistics (2014 or 2015)	% of total Viet Nam market
1	SGN	26,546,475	47.8%
2	HAN	14,190,675	25.5%
3	DAD	4,989,687	9.0%
4	CXR	2,062,494	3.7%
5	VII	1,222,698	2.2%
6	HUI	1,159,499	2.1%
7	PQC	1,002,750	1.8%
	other	4,374,145	7.9%

Table 6: Top 7 busiest Airports in Viet Nam (Source: Albatross Airport, 2016).

Figure 6: Map of Viet Nam's busiest airports (Source: Google maps)

Ho Chi Minh City Airport (SGN)

Ho Chi Minh City Airport is Viet Nam's largest international airport in terms of area, serving Ho Chi Minh City as well as the rest of Southeastern Viet Nam. After recent expansion to meet increasing demand, it currently has a handling capacity of 25 million passengers per year. SGN is also the largest airport of Viet Nam and one of the top 50 busiest airports in the world in terms of passengers handled. It served over 26.5 million passengers in 2015. The airport has two terminals and two runways. According to a master plan approved in 2006, a new airport—Long Thanh International Airport—will replace SGN for international departure use. Upon completion of Long Thanh International Airport (2020 for Stage one and 2035 for Stage two), SGN will serve domestic passengers only.

Noi Bai International Airport (HAN)

Noi Bai International Airport is located about 35 kilometres northeast of downtown Ha Noi, the capital of Viet Nam. Serving 24 million passengers in 2015, it is the second largest airport in Viet Nam. The airport is currently the main hub of Viet Nam's flag carrier Viet Nam Airlines, as well as a major hub of low-cost carriers Vietjet Air and Jetstar Pacific. HAN consists of two passenger terminals and two runways.

Da Nang International Airport (DAD)

Da Nang International Airport is an important transportation hub in the central region. The airport is located 3.2km from the city centre. DAD is the third busiest airport in Viet Nam, handling 5 million passengers in 2015. It serves a hub for Viet Nam Airlines. The airport consists of two runways and a

single passenger terminal. An expansion of the terminal is currently considered to increase its capacity to 10 million passengers per annum by 2020.

Cam Ranh International Airport (CXR)

Cam Ranh International Airport is located on Cam Ranh Bay in Cam Ranh, a town in the province of Khanh Hoa in Viet Nam. It serves the city of Nha Trang, which is 30km from the airport. CXR handled 2.1 million in 2015. It serves as a hub for Jetstar Pacific Airlines, Viet Nam Airlines, VietJet Air. The airport has a single terminal and two runways.

3.3.2   Principal airline operators

Vietnam Airlines

Vietnam Airlines is the flag carrier of Viet Nam, founded in 1956. Vietnam Airlines is headquartered in Long Bien District, Ha Noi, with hubs at HAN and SGN. The airline flies to 52 destinations in 17 countries. It owns 100% of Vietnam Air Service Company – a regional airline in southern Viet Nam, 70% of the low-cost carrier Jetstar Pacific Airlines, and 49% of the Cambodian national airline Cambodia Angkor Air. Vietnam Airlines became a member of SkyTeam in June 2010, making it the first Southeast Asian carrier to have joined that alliance. The airline fleet comprises of 99 aircraft.

International APEC destinations include Japan; Republic of Korea; Singapore; and Thailand.

VietJet Air

VietJet Air is an international low-cost airline from Viet Nam. It was established in 2011, becoming the first privately owned airline in Viet Nam. It is headquartered at SGN, with another hub at HAN. The airline fleet has a total of 31 aircraft.

The only International APEC destination it serves is Thailand.

Jetstar Pacific

Jetstar Pacific is a low-cost airline headquartered in, Ho Chi Minh City, Viet Nam. It began operations in 1991. With its hub at in SGN, the airline operates scheduled domestic and international services along with charter flights. The airline fleet comprises of 25 aircraft.

The only international APEC destination it serves is Thailand.

4. Medium-term new route opportunities

This section of the report is dedicated to explaining the potential future air service developments to and from Viet Nam within the APEC region over the next three years. Service gaps, route traffic forecasts, and high-level feasibility analysis will be conducted.

4.1 Service gaps

As part of the process, air services to Viet Nam were considered at an economy-pair and city-pair basis.

4.1.1 Economy pair analysis

The following table outlines the supply and demand for air travel between Viet Nam and other APEC economies. The data essentially shows the economy pairs where

- non-stop service is sufficiently supplied (in green),
- air service is adequate but may need to be improved in the long term (in yellow), and
- air service is at a shortfall and should be improved in the medium term (in red).

Origin Economy	Demand (PDEW)	Non-Stop Seat Offer (SDEW)	One-Stop Seat Offer (SDEW)	Ratio of Demand to Supply
Australia (AUS)	763	597	0	128%
Brunei Darussalam (BD)	31	77	0	40%
Canada (CDA)	225	0	0	***
Chile (CHL)	1	0	0	*
People's Republic of China (PRC)	2,206	2,815	141	75%
Hong Kong, China (HKC)	950	1,922	0	49%
Indonesia (INA)	373	178	0	210%
Japan (JPN)	2,265	3,036	0	75%
Republic of Korea (ROK)	2,748	4,353	0	63%
Malaysia (MAS)	1,576	2,575	0	61%
Mexico (MEX)	2	0	0	*
New Zealand (NZ)	51	1	0	5960%
Papua New Guinea (PNG)	0	0	0	*
Peru (PE)	0	0	0	*
The Republic of the Philippines (PH)	328	436	0	75%
Russia (RUS)	19	0	0	*
Singapore (SGP)	2,363	3,805	42	61%
Chinese Taipei (CT)	1,865	2,968	0	63%
Thailand (THA)	2,603	4,514	0	58%
United States (US)	1,838	0	262	700%

Table 7: Total daily demand (PDEW), non-stop seat offer (SDEW), one-stop seat offer (SDEW) and demand-to-supply ratio (Source: IATA analysis of Airport IS Data)

* Delineates an economy pair with no air services that has inadequate demand to consider air services in the long term
***Delineates an economy pair with no air services that may have adequate demand for service in the short-medium term (within the next 5 years)

In some cases, the demand-to-supply ratio is less than 60%, however supply is still adequate as the low percentage figure may be representative of high rates of connecting passengers flying between economies (not shown in the above table – only OD traffic is displayed).

Where demand-to-supply ratios are higher than 80%, seat offer should be increased between economy pairs (i.e. Viet Nam to Indonesia at 210%, where the one-stop supply only covers a portion of the total demand between the economies).

Based on the analysis at the economy level, Viet Nam may need to improve service to seven economies in the long term (highlighted in yellow), and could take actions to increase service frequencies with four economies in the medium term (highlighted in red). The remaining eight destination economies are adequately served at an economy-pair level or have inadequate demand for non-stop services in the scope of this report. The following section will look into greater detail at the shortfalls in supply at a city-pair level.

4.1.2 City pair analysis by APEC economy

When considering the shortfall in service on city-pairs level in Viet Nam, 25 routes with a demand of 30 or greater PDEW (10,950 annual pax) with no non-stop service were examined. These city pairs listed by economy are seen in the table below.

Origin Airport	Origin Economy	Destination Airport	Destination Economy	2015 OD Demand (PDEW)
HAN	Viet Nam	SYD	Australia	62
SGN	Viet Nam	BNE	Australia	58
HAN	Viet Nam	MEL	Australia	51
SGN	Viet Nam	PER	Australia	46
SGN	Viet Nam	YYZ	Canada	70
SGN	Viet Nam	YVR	Canada	38
SGN	Viet Nam	CTU	China	33
HAN	Viet Nam	CGK	Indonesia	52
SGN	Viet Nam	DPS	Indonesia	35
HAN	Viet Nam	CTS	Japan	34
SGN	Viet Nam	PEN	Malaysia	67
DAD	Viet Nam	BKK	Thailand	56
SGN	Viet Nam	HKT	Thailand	44
SGN	Viet Nam	LAX	United States	221
SGN	Viet Nam	SFO	United States	162
SGN	Viet Nam	JFK	United States	106
SGN	Viet Nam	IAD	United States	79
SGN	Viet Nam	IAH	United States	69
SGN	Viet Nam	ORD	United States	67
HAN	Viet Nam	LAX	United States	66
SGN	Viet Nam	BOS	United States	51
HAN	Viet Nam	JFK	United States	48
SGN	Viet Nam	ATL	United States	40
SGN	Viet Nam	HNL	United States	39
HAN	Viet Nam	SFO	United States	34

Table 8: APEC routes to/from Viet Nam with 30 or greater PDEW with no non-stop service
(Source: IATA analysis of Airport IS data).

4.2 High-level feasibility considerations

As a way to further define a viable route selection among these 25 city-pairs, IATA used two metrics: distance and market size. Due to aircraft range restrictions, city pairs with distance over 15,000km apart from one another are eliminated. The second criterion used the application of induction and connection potential rates (unique to each region and route type) to determine if the route would garner demand of a minimum demand threshold within the coming three years (113 PDEW for short-haul routes under 4,000km, 135 PDEW for long-haul routes or 158 PDEW for ultra-long-haul routes over 12,000km). The selection process is seen below:

Origin Airport	Origin Economy	Destination Airport	Destination Economy	2015 OD Demand	2015 Estimated Market Potential	Distance viable for non-stop flight with current technology	Market size adequate for non-stop service in the medium term	Proposed Route
SGN	Viet Nam	LAX	United States	221	288	✓	✓	Yes
SGN	Viet Nam	ORD	United States	67	189	✓	✓	Yes
SGN	Viet Nam	SFO	United States	162	188	✓	✓	Yes
SGN	Viet Nam	YYZ	Canada	70	154	✓	✓	Yes
SGN	Viet Nam	BNE	Australia	58	145	✓	✓	Yes
SGN	Viet Nam	YVR	Canada	38	129	✓	✗	No
SGN	Viet Nam	JFK	United States	106	127	✓	✗	No
SGN	Viet Nam	PER	Australia	46	123	✓	✓	Yes
DAD	Viet Nam	BKK	Thailand	56	109	✓	✗	No
HAN	Viet Nam	LAX	United States	66	108	✓	✗	No
HAN	Viet Nam	CGK	Indonesia	52	106	✓	✓	Yes
SGN	Viet Nam	PEN	Malaysia	67	106	✓	✓	Yes
HAN	Viet Nam	SYD	Australia	62	104	✓	✗	No
SGN	Viet Nam	IAD	United States	79	101	✓	✗	No
SGN	Viet Nam	IAH	United States	69	92	✓	✗	No
HAN	Viet Nam	MEL	Australia	51	88	✓	✗	No
SGN	Viet Nam	HKT	Thailand	44	78	✓	✗	No
SGN	Viet Nam	BOS	United States	51	76	✓	✗	No
SGN	Viet Nam	ATL	United States	40	65	✓	✗	No
SGN	Viet Nam	HNL	United States	39	64	✓	✗	No
HAN	Viet Nam	SFO	United States	34	62	✓	✗	No
SGN	Viet Nam	DPS	Indonesia	35	61	✓	✗	No
HAN	Viet Nam	JFK	United States	48	61	✓	✗	No
HAN	Viet Nam	CTS	Japan	34	61	✓	✗	No
SGN	Viet Nam	CTU	China	33	55	✓	✗	No

Table 9: Viable distance is used as any route under 15,000km, and viable demand is calculated as any route serving a minimum of 113, 135, or 158 PDEW within the coming three years, depending on whether or not the route is short-haul, medium-haul, or long-haul. Calculations are shown in market potential analysis below.

4.3 Proposed route analysis

Based on the filtering process applied above, IATA identified eight routes which could be established through Viet Nam in the medium term. This analysis does not consider the fares paid by passengers, instead using only the rates of supply and demand to base the analysis. The section below decomposes the route potential and presents a forecast of the current demand in the medium term.

4.3.1 Route SGN-LAX

SGN-LAX 2015 total route potential definition:

Origin Airport	Destination Airport	Destination Economy	2015 OD Non-direct Demand	OD Captured Though Deorect Service	OD Stimulation	Behind/Beyond Connecting Potential	Caculations
SGN	LAX	United States	(A) 221	(B) 80%	(C) 12	(D) 31%	
				(1) 177			(1) = AxB
					21		(2) = 1xC
				-2			
				Subtotal (3)	198		(3) = 1+2
		SGN - LAX Total Market Potential (2015 Base)				(4) 288	(4) = 3/(1-D)

Based on 2015 demand figures, IATA estimates that the SGN-LAX presents a potential of 288 PDEW for a direct service between the two cities. This potential is forecast grow to 333 by 2018 as shown in the following table.

This forecast uses the 2015 estimated demand and applies to it the IATA inter and intra-regional global traffic forecast published by our Economics Division.

Economy Pair	City Pair	2015 Base	2016	2017	2018
Viet Nam-United States	SGN-LAX	288	302	317	333

4.3.2 Route SGN-ORD

SGN-ORD 2015 total route potential definition:

Origin Airport	Destination Airport	Destination Economy	2015 OD Non-direct Demand	OD Captured Though Deorect Service 1	OD Stimulation 2	Behind/Beyond Connecting Potential 4	Caculations
SGN	ORD	United States	(A) 67	(B) 80%	(C) 41	(D) 60%	
				(1) 54			(1) = AxB
					22		(2) = 1xC
				(2)			
				Subtotal (3)	76		(3) = 1+2
		SGN - LAX Total Market Potential (2015 Base)				(4) 189	(4) = 3/(1-D)

Based on 2015 demand figures, IATA estimates that the SGN-ORD route presents a market potential of 189 PDEW for a direct service between the two cities.

This potential is forecasted to grow to 219 PDEW by 2018 as shown in the following table:

Economy Pair	City Pair	2015 Base	2016	2017	2018
Viet Nam-United States	SGN-ORD	189	199	209	219

4.3.3   Route SGN-SFO

SGN-SFO 2015 total route potential definition:

Origin Airport	Destination Airport	Destination Economy	2015 OD Non-direct Demand	OD Captured Though Deorect Service (1)	OD Stimulation (2)	Behind/Beyond Connecting Potential (4)	Caculations
SGN	SFO	United States	(A) 162	(B) 80%	(C) 16	(D) 20%	
				(1) 129	21		(1) = AxB
				(2)			(2) = 1xC
			Subtotal (3)		150		(3) = 1+2
			SGN - SFO Total Market Potential (2015 Base)			(4) **188**	(4) = 3/(1-D)

Based on 2015 demand figures, IATA estimates that the SGN-SFO route presents a market potential of 188 PDEW for a direct service between the two cities.

This potential is forecasted to grow to 217 PDEW by 2018 as shown in the following table:

Economy Pair	City Pair	2015 Base	2016	2017	2018
Viet Nam-United States	SGN-SFO	188	197	207	217

4.3.4   Route HAN-CGK

HAN-CGK 2015 total route potential definition:

Origin Airport	Destination Airport	Destination Economy	2015 OD Non-direct Demand	OD Captured Though Deorect Service (1)	OD Stimulation (2)	Behind/Beyond Connecting Potential (4)	Caculations
HAN	CGK	Indonesia	(A) 52	(B) 80%	(C) 100%	(D) 22%	
				(1) 41	42		(1) = AxB
				(2)			(2) = 1xC
			Subtotal (3)		83		(3) = 1+2
			HAN - CGK Total Market Potential (2015 Base)			(4) **106**	(4) = 3/(1-D)

Based on 2015 demand figures, IATA estimates that the CGK-HAN presents a potential of 106 PDEW for a direct service between the two cities.

This potential would grow to 113 by 2018 as displayed in the short term forecast in the following table:

Economy Pair	City Pair	2015 Base	2016	2017	2018
Viet Nam - Indonesia	HAN-CGK	106	112	118	124

4.3.5 Route SGN-PER

SGN-PER 2015 total route potential definition:

Origin Airport	Destination Airport	Destination Economy	2015 OD Non-direct Demand	OD Captured Though Deorect Service [1]	OD Stimulation [2]	Behind/Beyond Connecting Potential [4]	Caculations
SGN	PER	Australia	(A) 46	(B) 80%	(C) 100%	(D) 40%	
				(1) 37			(1) = AxB
					38		(2) = 1xC
				(2)			
			Subtotal	(3)	74		(3) = 1+2
		HAN - CGK Total Market Potential (2015 Base)				(4) 123	(4) = 3/(1-D)

Based on 2015 demand figures, IATA estimates that the SGN-PER route presents a market potential aof 123 PDEW for a direct service between the two cities.

This potential would grow to 144 by 2018 as displayed in the short term forecast in the following table:

Economy Pair	City Pair	2015 Base	2016	2017	2018
Viet Nam-Australia	SGN-PER	123	130	137	144

4.3.6 Route SGN-BNE

SGN-BNE 2015 total route potential definition:

Origin Airport	Destination Airport	Destination Economy	2015 OD Non-direct Demand	OD Captured Though Deorect Service [1]	OD Stimulation [2]	Behind/Beyond Connecting Potential [4]	Caculations
SGN	BNE	Australia	(A) 58	(B) 80%	(C) 86%	(D) 40%	
				(1) 47			(1) = AxB
					41		(2) = 1xC
				(2)			
			Subtotal	(3)	87		(3) = 1+2
		SGN - BNE Total Market Potential (2015 Base)				(4) 145	(4) = 3/(1-D)

Based on 2015 demand figures, IATA estimates that the SGN-BNE route presents a market potential of 145 PDEW for a direct service between the two cities.

This potential would grow to 170 by 2018 as displayed in the short term forecast in the following table:

Economy Pair	City Pair	2015 Base	2016	2017	2018
Viet Nam-Australia	SGN-BNE	145	153	161	170

4.3.7   Route SGN-YYZ

SGN-YYZ 2015 total route potential definition:

Origin Airport	Destination Airport	Destination Economy	2015 OD Non-direct Demand	1 OD Captured Though Deorect Service	2 OD Stimulation	4 Behind/Beyond Connecting Potential	Caculations
SGN	PEN	Malaysia	(A) 67	(B) 80%	(C) 80%	(D) 9%	
				(1) 54	44		(1) = AxB
				(2)			(2) = 1xC
			Subtotal (3)		96		(3) = 1+2
			SGN - PEN Total Market Potential (2015 Base)			(4) 106	(4) = 3/(1-D)

Based on 2015 demand figures, IATA estimates that the SGN-YYZ route presents a market potential of 154 PDEW for a direct service between the two cities.

This potential would grow to 178 by 2018 as displayed in the short term forecast in the following table:

Economy Pair	City Pair	2015 Base	2016	2017	2018
Viet Nam-Canada	SGN-YYZ	154	162	170	178

4.3.8   Route SGN-PEN

SGN-PEN 2015 total Route potential definition:

Origin Airport	Destination Airport	Destination Economy	2015 OD Non-direct Demand	1 OD Captured Though Deorect Service	2 OD Stimulation	4 Behind/Beyond Connecting Potential	Caculations
SGN	PEN	Malaysia	(A) 67%	(B) 80%	(C) 80%	(D) 9%	
				(1) 54	44		(1) = AxB
				(2)			(2) = 1xC
			Subtotal (3)		96		(3) = 1+2
			SGN - PEN Total Market Potential (2015 Base)			(4) 106	(4) = 3/(1-D)

Based on 2015 demand figures, IATA estimates that the SGN-PEN route presents a market potential of 106 PDEW for a direct service between the two cities.

This potential would grow to 124 by 2018 as displayed in the short term forecast in the following table. This forecast uses the 2015 estimated demand and applies to it the IATA inter and intra-regional global traffic forecast published by our Economics Division.

Economy Pair	City Pair	2015 Base	2016	2017	2018
Viet Nam - Malaysia	SGN-PEN	106	112	118	124

4.4 High-level feasibility analysis

This section considers the above route through three main feasibility criteria:

- air service agreements
- airline network strategies and fleets
- route economics

Additionally, proposed operational aspects of the route are presented, including a proposed airline to serve the route, type of aircraft to be used, flight frequency, and estimated load factors. The demand capture rate is reduced on services which are not served on a daily basis.

4.4.1 Route SGN-LAX

SGN is the largest airport in Viet Nam serving Ho Chi Minh City. Along with Ha Noi, SGN is one of the two major operating bases of Vietnam Airlines. The route LAX-SGN has a range of 13,116km and would require B787 or A350. Vietnam Airlines has recently acquired B787-9 aircraft, which would also be capable of operating this route.

The high demand on the SGN-LAX route will allow Vietnam Airlines to operate 11-weekly service with a B787-9 aircraft. The load factor is estimated to be 74%

Route (non-directional)	Minimum Opening Date	Airline	Aircraft	# of Seats	Frequency per week	Number of Pax per Flight	Load Factor
SGN-LAX	2017	Vietnam Airlines	B787-9	274	11	202	74%

Operating conditions such as prevailing wind may affect the performance of the aircraft and payload may be restricted in certain direction.

4.4.2 Route SGN-ORD

The route ORD-SGN has a range of 13,973km. Very few aircraft is able to cover this range at present and the best candidate for this route is American Airlines with the B777-300ER aircraft.

Based on the projected demand in 2017 of 209 PDEW, the route can start service on a daily basis with the B777-300ER (260 seats). This would give the attractive load factors of above 80% for the projected route.

Route (non-directional)	Minimum Opening Date	Airline	Aircraft	# of Seats	Frequency per week	Number of Pax per Flight	Load Factor
SGN-ORD	2017	American Airlines	B777-300ER	260	7	209	80%

Operating conditions such as prevailing wind may affect the performance of the aircraft and payload may be restricted in certain direction.

4.4.3 Route SGN-SFO

The route SFO-SGN has a range of 12,614km with an estimated 15 hours 20 minutes' block time. Likely aircraft for this route include B787 or A350.

Based on the projected demand in 2017 of 207 PDEW, the route would suit Vietnam Airlines' B787-9 (274 seats) operated on a daily basis. The load factor is estimated to be around 76%.

Route (non-directional)	Minimum Opening Date	Airline	Aircraft	# of Seats	Frequency per week	Number of Pax per Flight	Load Factor
SGN-SFO	2017	Vietnam Airlines	B787-9	274	7	207	76%

Operating conditions such as prevailing wind may affect the performance of the aircraft and payload may be restricted in certain direction.

4.4.4 Route HAN-CGK

The HAN-CGK route can be considered by Garuda Indonesia, making use of the B737-800 aircraft configured with 160 seats. With a 5-weekly service to start with in 2017, it is estimated that the load factor will be a healthy 83%.

Route (non-directional)	Minimum Opening Date	Airline	Aircraft	# of Seats	Frequency per week	Number of Pax per Flight	Load Factor
HAN-CGK	2017	Garuda Indonesia	B737-800	160	5	132	83%

4.4.5 Route SGN-PER

Ho Chi Minh City to Perth can be operated by Vietnam Airlines, using an A330-200 aircraft configured with 266 seats. Assuming the route opens in 2017 with a 5-weekly frequency, the load factor is estimated to be around 72%.

Route (non-directional)	Minimum Opening Date	Airline	Aircraft	# of Seats	Frequency per week	Number of Pax per Flight	Load Factor
SGN-PER	2017	Vietnam Airlines	A330-200	266	5	192	72%

4.4.6 Route SGN-BNE

PER-SGN route can be considered by Vietnam Airlines, utilizing the A330-200 aircraft. With 266 seats on board and a frequency of 5 a week, it is estimated the load factors will reach a healthy 72%.

Route (non-directional)	Minimum Opening Date	Airline	Aircraft	# of Seats	Frequency per week	Number of Pax per Flight	Load Factor
PER-SGN	2017	Vietnam Airlines	A330-200	266	5	192	72%

Similar to the BNE-SGN route, IATA does not foresee any issues for this route to be operated based on the current high-level policies in place in Australia and Viet Nam. Based on a consultation of the Australian Airports Association report on liberalizing Australia's air service agreements (Australian Airports Association, 2015), and the Australian government's register of available capacity (Australian Government, 2016), there appears to be adequate capacity between the economy pairs at the present time.

4.4.7 Route SGN-YYZ

The YYZ-SGN is a very long route and potentially can be operated by Air Canada's B787-9. The distance between the two cities is close to the maximum range of the aircraft, so the airlines may have certain operational constraints if flying condition is not ideal (e.g. strong head wind), which is not included in this analysis. On a pure market-base point of view, this route can be operated by Air Canada's B787-9 aircraft with a 5 weekly service starting in 2018:

Route (non-directional)	Minimum Opening Date	Airline	Aircraft	# of Seats	Frequency per week	Number of Pax per Flight	Load Factor
SGN-YYZ	2018	Air Canada	B777-300ER	298	5	250	84%

4.4.8 Route SGN-PEN

Jetstar Pacific, with its hub at SGN, is considered as one of the potential candidate to open this new route.

Considering the estimated demand of 131 PDEW in 2017, a six-weekly frequency could be operated in the beginning.

The proposed service would operate at a healthy estimated average load factor of 73% as illustrated below:

Route (non-directional)	Minimum Opening Date	Airline	Aircraft	# of Seats	Frequency per week	Number of Pax per Flight	Load Factor
SGN-PEN	2017	Jetstar Pacific	A320	180	6	131	73%

In terms of air service agreements, IATA does not foresee any issues for this route.

5. Conclusions and opportunities

In addition to the development of new air services in the medium term, other opportunities for air service development such as connectivity improvement, route frequency increases, and long-term developments are also presented.

5.1 Connectivity improvement

This section identifies poorly connected markets that could be better served by improved connecting times, hence granting additional access to already existing yet less accessible connecting markets.

IATA examined flights operating to and from SGN and HAN for this analysis. A small selection of improvements could be identified, based on optimal connecting time-related considerations. Below is a summary of the potential optimizations:

- Vietnam Airlines flight 124 currently departing SGN for DAD at 12:55: should the departure time be moved back by 15 minutes to 13:10, it would enable two more connections from REP and TPE.

- Vietnam Airlines flight 262 currently departing SGN for HAN at 23:10: delaying the departure time of this flight by 15 minutes would enable three domestic connections (VCL, BMV, DLI) and one international connection from SYD.

- VietJet Air flight 155 currently departing HAN for SGN at 18:45: pushing back the departure time by 10 minutes would enable two more connections from MFM and ICN.

- Vietnam Airlines flight 416 currently departing HAN for ICN at 23:40: delaying the departure time of this flight by 15 minutes would enable six additional domestic flights (from SGN and PQC) to connect.

- Vietnam Airlines flight 506 currently departing HAN for CAN at 12:40: delaying the departure time of this flight by 15 minutes would enable four additional domestic flights (from SGN, UIH, VCL, PXU, VDH, PQC and CXR) to connect.

5.2 Route frequency increase

IATA considered all of the international non-stop routes from Viet Nam to determine whether the current non-stop supply adequately matches the demand. Numerous city pairs from Viet Nam with inadequate non-stop service were identified.

Due to the fact that most aircraft only fly at an average 80% load factor, the ideal demand-to-supply ratio should be under 80%. All of the identified routes in the table below have demand-to-supply ratios of greater than 80%.

Origin Airport	Origin Economy	Destination Airport	Destination Economy	2015 OD Demand (PDEW)	Non-Stop Seats in 2015 (SDEW)	Demand Excess over Supply (PDEW)	Ratio of Demand to Non-Stop Supply
DAD	Viet Nam	PEK	China	45	46	-1	98%
DAD	Viet Nam	PVG	China	52	53	-1	98%
DAD	Viet Nam	CAN	China	48	53	-5	91%
SGN	Viet Nam	PEK	China	64	77	-13	98%
SGN	Viet Nam	CGK	Indonesia	168	178	-10	95%
SGN	Viet Nam	FUK	Japan	62	55	7	112%
SGN	Viet Nam	NGO	Japan	92	91	1	101%
DAD	Viet Nam	NRT	Japan	123	143	-20	86%
CXR	Viet Nam	ICN	Republic of Korea	60	75	-14	81%
SGN	Viet Nam	JHB	Malaysia	101	118	-17	86%
HAN	Viet Nam	MNL	The Philippines	60	74	-15	80%
PQC	Viet Nam	SIN	Singapore	41	33	7	122%
DAD	Viet Nam	SIN	Singapore	98	95	3	103%
DAD	Viet Nam	TPE	Chinese Taipei	26	14	12	189%
SGN	Viet Nam	RMQ	Chinese Taipei	130	151	-21	86%
SGN	Viet Nam	KHH	Chinese Taipei	240	279	-39	86%
HAN	Viet Nam	KHH	Chinese Taipei	113	137	-24	82%

Table 10: Description of the route for frequency increase

5.3 Long-term new route opportunities

As economy growth is expected to continue within Viet Nam and the APEC region, many of the routes identified in section 4 are expected to become viable in the longer term:

Origin Airport	Origin Economy	Destination Airport	Destination Economy	2015 OD Demand	2015 Estimated Market Potential	Distance viable for non-stop flight with current technology	Market size adequate for non-stop service in the long term	Potential Route in the long term
SGN	Viet Nam	PER	Australia	46	123	✔	✔	Yes
HAN	Viet Nam	SYD	Australia	62	104	✔	✔	Yes
HAN	Viet Nam	MEL	Australia	51	88	✔	✔	Yes
SGN	Viet Nam	YVR	Canada	38	129	✔	✔	Yes
DAD	Viet Nam	BKK	Thailand	56	109	✔	✔	Yes
SGN	Viet Nam	JFK	United States	106	127	✔	✔	Yes
SGN	Viet Nam	SEA	United States	28	110	✔	✔	Yes
HAN	Viet Nam	LAX	United States	66	108	✔	✔	Yes
SGN	Viet Nam	IAD	United States	79	101	✔	✔	Yes
SGN	Viet Nam	IAH	United States	69	92	✔	✔	Yes
HAN	Viet Nam	ORD	United States	21	84	✔	✔	Yes

Table 11: Long-term route opportunities to and from Viet Nam

5.4 Development of aircraft technology

The latest aircraft available on the market, Airbus' A350-900 and Boeing's B787-9 are capable of flying ultra-long-haul routes. The technical capabilities of these aircraft will allow new direct routes to be operated between APEC economies across the Pacific. The following map illustrates the range limit[1] of A350-900 and B787-9:

Figure 7: Range limit for the latest generation of aircraft from Ha Noi (Source: GCMap)

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[1] For illustration only. Based on published range for the base model of each aircraft type. Specific operating conditions may affect the range of the aircraft.

6. Recommendations to improve air connectivity

The various recommendations to improve air connectivity both generically and specifically for each APEC member economy are presented in this section.

6.1 Generic recommendations

Generic recommendations are those which could be applied to all economies, such as greater liberalization of air routes by allowing more access and the elimination of curfews and operational restrictions.

- Continue to liberalize the air services market to other APEC economies, allowing the fullest access to Vietnamese airports.
- Explore the feasibility to lift potential restrictions in place at some Vietnamese airport.

6.2 Specific recommendations

- Ensure that the capabilities and capacity of the existing airports remains adequate to cater future demand, particularly at DAD, CXR and SGN.

6.3 How the APEC economy's regulator can help

- Work closely with different stakeholders such as the Viet Nam National Administration of Tourism, Viet Nam Chamber of Commerce and Industry, etc. to gain a deeper understanding of the development of the aviation demand.
- Maintain the liberal visa requirements for international tourists.

7. Appendix

7.1 Overview of IATA and IATA Consulting

7.1.1 IATA

IATA – The International Air Transport Association was founded in 1945 as the prime vehicle for inter-airline cooperation in promoting safe, reliable, secure and economical air service for the benefit of the world's consumers. IATA is fully committed to supporting the commercial aviation industry's stakeholders and governments in their efforts to achieve profitability and long-term viability.

IATA's mission:

- To represent, lead and serve the airline industry.

IATA's vision:

- To be the force for value creation and innovation, driving a safe, secure and profitable air transport industry that sustainably connects and enriches our world.

IATA in numbers:

- 250+ member airlines
- 83% of total air traffic
- $387B processed by IATA financial systems
- 1,400+ employees
- 54 offices in 53 countries

7.1.2 IATA Consulting

IATA Consulting overview

IATA Consulting has comprehensive experience in the full array of business challenges facing the aviation sector. Serving the airline industry for 70 years, IATA has developed unrivalled practical experience, which we bring forth to provide the best solutions to our clients.

With our depth and breadth of aviation industry experience, we assist clients to maximize the value of their operating model, realize growth ambitions and gain insights that translate into sustainable competitive advantages.

IATA Consulting has expertise in the following areas:

SAFETY & FLIGHT OPERATIONS

Solutions for aviation organizations and airlines to improve safety, efficiency and air transport management.

ENVIRONMENT & ECONOMICS

Solutions for fulfilling the vision of a safer, more competitive and sustainable aviation industry.

AIRLINES

Solutions to achieve real and lasting results in every aspect of airline commercial and operational management.

AIRPORTS, PASSENGERS & SECURITY

Solutions to plan your airport efficiently to avoid costly mistakes and profit from untapped opportunities.

GROUND HANDLING & CARGO

Solutions to optimize your operations and improve your safety and security while reducing costs.

Our Clients

IATA Consulting has successfully demonstrated its capabilities by providing airlines, airports, tourism offices and other organizations with accurate, unbiased and reliable high quality information and analysis to help them define and understand their markets, while ensuring their long-term facility development and financial success.

IATA is trusted by multiple clients all over the world including airlines, airports, governments and aviation institutions.

Why IATA Consulting was chosen for this project

IATA has, over time, recruited and retained some of the most highly experienced and capable aviation consulting resources within the aviation industry. Due to its position at the heart of the industry, IATA has access to exceptionally skilled and informed subject matter experts and specialists. IATA Consulting's objective is to make a positive difference in its clients' performance, while delivering quality services to all industry stakeholders.

IATA Consulting provides its customers with vast knowledge and expertise in all sectors of the industry worldwide. Our approach has been finely tuned to leverage IATA's global presence and industry thought leadership position in the development of tailored solutions that fit with local cultural considerations and embody international best practices. Our consultants rely on international state-of-the-art standards, unmatched access to data, and products and expert resources to provide cost-efficient and highly informed solutions.

IATA is backed by a robust set of decision support tools, Airport IS and Pax IS have been essential to undertake this study.

Airport IS and **Pax IS** are the most comprehensive aviation databases available in the marketplace, capturing 100% of traffic around the world and bringing together total market supply and demand under a single platform. The data provided is accurate and reliable as it is captured through IATA's Billing and Settlement Plan (BSP).

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